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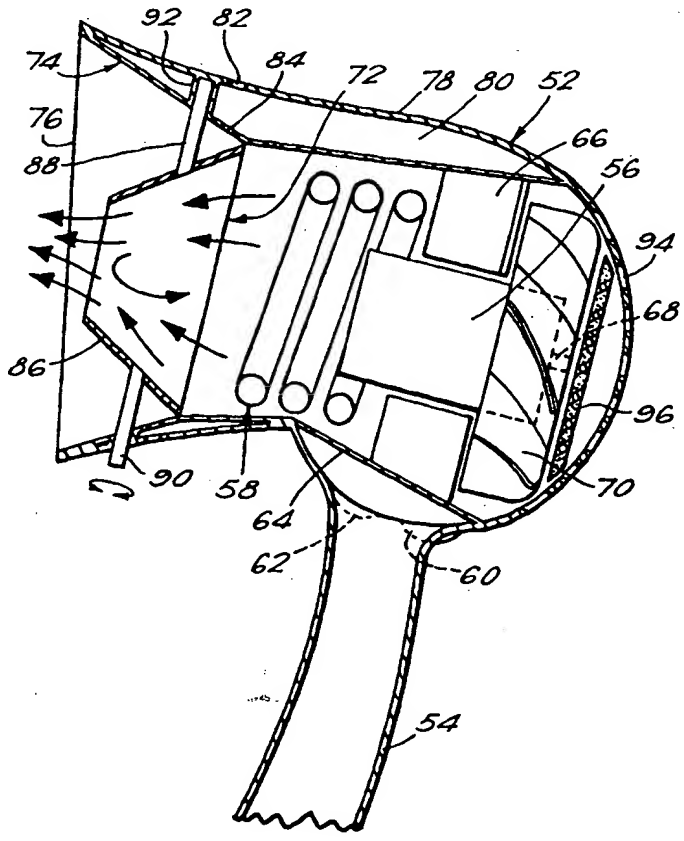
(54) Title: HAIRDRYERS

(57) Abstract

Large volume flow warm not hot air hairdryers are disclosed. They have a casing with a motor and fan, and an outwardly-divergent outlet passage. In one embodiment the passage may have a pivotable baffle (86) mounted in it to control the flow of the issuing air stream. In one of its limit positions (Figure 6), the pivotable baffle (86) effectively closes a throat of the drier to cause virtually all the air leaving the drier to issue from the narrower end of the baffle as a fast narrow stream. In its other limit position, the baffle guides the outgoing airstream into slow-moving warm airstream at a flow rate of 60-90 litres per section through the housing, and which at a distance of 40-46 cm from the dryer has a speed of 220 to 360 cm/second and a temperature of 45-60 °C.



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HAIRDRYERS

This invention relates to hairdryers, and particularly those of the type connected by flexible cable to the electricity mains and incorporating an electric motor driving a fan and electric heater elements over which air from the fan is passed to heat it. As is already known, the motor may be of two-speeds, and the heater element may be energised selectively to impart different rates of heating to the air passing through the heater.

Many known hairdryers have outlet passages of fixed geometry, so that the dimensions of the issuing stream of heated air are fixed. When the heater element is switched to produce its maximum amount of heat, this can result in the hairdryer producing a relatively-narrow stream of very hot air, which can be potentially damaging, particularly in the hands of an inexperienced user.

Most known hairdryers produce a parallel-sided circular-sectioned stream of cold or hot air. This stream may have its cross-sectional shape changed (reduced) by pushing a 'concentrater nozzle' on the end of the

hairdryer nozzle, to produce a rectangular-sectioned stream of accelerated air. It is also known to substitute a 'diffuser' for a concentrater nozzle, to disperse the warm air to give a gentle air flow. Such diffusers take the form of perforated surfaces intended to extend across the outlet of the hairdryer. In contradistinction, in the hairdryer of the present invention the desired gentle outflow of air is achieved without blocking the outlet. The hairdryer of this invention produces a 'warm breeze' rather than a 'hot blast' which is highly desirable when drying some hairstyles.

The present invention aims at providing a hairdryer adapted to produce a wide and/or divergent stream of heated air moving at relatively-low speed.

In its broadest aspect, the present invention provides an electric hairdryer comprising a housing, an electric motor therein, an axial fan secured to the motor and adapted to pass a stream of air over electrically-energised heater elements located within the housing to cause the heated air to flow through a circular throat, the housing having an outlet passage with divergent axial cross-section, wherein the hairdryer, when it is running, is capable of producing a stream of air at a flow rate through the housing of between 60-90 litres per second and preferably 70-80 litres per second, having a speed of between 220-360 cm per second and preferably of 268-313 cm per second and a temperature of 45°-60°C at a working distance of 40-46 cm from the outlet passage.

According to another aspect of the present invention, a method of drying hair consists in passing a warm flow of

air through a venturi and then allowing the stream of air emerging from the venturi to expand outwardly yet be constrained along an outwardly flared path without any obstruction to the air flow, whereby a substantially smooth stream of warm air emerges from the outwardly flared path into the ambient air.

The fact that the air stream is hardly obstructed is in contrast to the flows of turbulent air produced in the known diffusers of the prior art and there is the added advantage with such hardly obstructed air streams that back pressure and the problems it causes are eliminated or at least substantially reduced.

By means of this aspect of the invention, a substantially uniform flow is obtained. Moreover, it is possible to ensure by the appropriate choice of flare angle that the air stream does not break up, i.e. it maintains it integrity for a sufficient distance to provide a drying air stream for the hair after it has emerged from the constraint applied by the outwardly flared path and into the ambient air.

Preferably the flare angle is in the range of 10° to 25° is suitable with an angle in the range of 10° to 13° being particularly preferred.

Preferably the outwardly flared path is of frusto-conical form with the venturi being coaxial with the axis of the frusto-conical path.

Whilst the outwardly flared path acts also to increase the volume of air in the emergent air stream in relation to the amount of heat contained in the stream, the

increase in the velocity imparted by the venturi to the air flowing therethrough may be utilised to increase the volume of air still further by providing the neck of the venturi with at least one airflow aperture which is in communication with the ambient air. In this manner, ambient air is drawn into the air stream which will be at a lower temperature of the emergent air stream, thereby increasing still further the volume to heat ratio in the emergent airstream.

The ambient air is conveniently drawn into the venturi by at least one air entry aperture in a surrounding wall which is preferably of circular cross-section and advantageously through a plurality of apertures which form a ring of apertures around the wall.

In a preferred embodiment, the or each air entry aperture communicates with the air exit aperture in the venturi via an air reservoir which, during use of the attachment on a hairdryer, is at a lower pressure than that of the ambient air.

Alternatively, air channels communicating with the ambient air open out onto the venturi to permit flows of ambient air to be sucked into the attachment by the action of the venturi.

The air exit apertures and air channels may open out onto the venturi at it narrowest portion, i.e. its neck, but by arranging for the air exit apertures or channels to open out onto the venturi at locations that are downstream of its neck may be more advantageous because when the air pressure is increased by compression at the neck, when the air flow out again, a slight vacuum may be

created and the sucked in air also helps in reducing turbulence.

In order to ensure that the accelerated air stream exiting from the venturi into the outwardly flared path expands to occupy the full area of the path, at least one inner vane may be provided at a location downstream of the venturi and positioned such as to guide or deflect air outwardly without obstructing the air flow.

Preferably, the inner guide vane is arranged coaxially in the outwardly flared flow path.

According to a further aspect of the present invention, the hair is dried by creating a warm air stream in the ambient air which is variable between a first air stream which has a substantially uniform cross-sectional area and which has a volume of air which is high in relation to the amount of heat in the air stream and between a second air stream which is narrower and flows at a relatively higher velocity than that of first air stream.

The variation in the air stream may be produced by providing at least one outer vane disposed outwardly of and extending downstream of the inner vane and by moving a member which defines the frusto-conical path axially with respect to, and towards the venturi, and into a position in which the outer vane cooperates with the venturi to guide or deflect the air exiting from the venturi in a stream which extends substantially parallel to the axis of the frusto-conical path and into the ambient air.

With attachments constructed in accordance with the

invention, the smoothly flowing first air stream will have a cross-sectional area that is several times larger than that of the second air stream yet dry the hair in an efficient and careful manner.

The outwardly flared member may be moved in any suitable way relative to the venturi, e.g. by means of a slidable connection defining at least two positions and being held in those positions by any appropriate means such as a detent engaging in a recess or by a turnable connection involving say cooperative screw threads.

The hairdryer of the invention may be constructed to give the features set out above by using an existing hairdryer of sufficient capacity (most are not) plus an attachment including the divergent outlet passage, but it is preferred to embody the invention in a purpose built and designed unit.

The flexibility of being able to use the hairdryer, if desired, as a prior art type drier producing a hot narrow airstream can, however, be retained if needed; this may be done in a hairdryer according to the invention by arranging the outlet passage a frusto-conical hollow baffle which is rotatable about an axis transverse to the airflow between one limit position in which its wider end substantially closes the throat to direct the air passing through the throat to issue from the narrower end of the baffle, and another limit position in which its narrow end is spaced substantially uniformly from the throat to direct the air passing through the throat both through and around the baffle.

In accordance with one feature of the hairdryer of this

invention, the electric motor body is mounted on substantially radially-extending fins adapted to reduce the turbulence of the air leaving the fan.

According to another feature, the housing of the hairdryer is perforated on the upstream side of the fan, and a disc of filter material is positioned between the perforated wall of the housing and the fan.

The present invention includes not only hairdryers as set out above, but also extends to attachments for conventional hairdryers which convert them to hairdryer comprising any one or more of the features referred to hereinabove, kits of parts comprising such attachments and hair driers incorporating such attachments.

The present invention will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of a hairdryer attachment constructed in accordance with one aspect of the invention, fitted to the nose of a hand-held hairdryer, also perspective,

Figure 2 is a longitudinal section through the attachment of Figure 1, in one position in which the attachment delivers a broad, diffused warm air stream into the ambient air,

Figure 3 is a longitudinal cross-section of the attachment of Figure 1, in another position in which the attachment delivers a narrower, more concentrated warmer air stream into the ambient

air, and

Figure 4 is a cross-sectional detail of a modification.

Figure 5 is a diagrammatic sectional view of another form of the hairdryer of the present invention, with the section being taken along the line of flow of the air;

Figure 6 is a view similar to Figure 5 of the hairdryer of Figure 5 with its baffle in its other limit position;

Figure 7 is a front elevation of the outlet end of the hairdryer of Figures 5 and 6, with the baffle in one limit position, and

Figure 8 is a view similar to Figure 7 of the hairdryer with its baffle in the other limit position.

Referring to Figures 1 to 4 of the drawings, there is shown an attachment 1 for a hairdryer 2 which is fitted over the hairdryer note 3, with a tight fit, by means of an annular portion 4. The annular portion 4 is provided with a ring of air flow apertures 5 which pass through a ridge 6 in a cylindrical portion 11 and communicate via a reservoir 7 with air flow apertures 8 in a venturi 9. In this illustrated embodiment, the air flow apertures 8 are located in the neck 10 of the venturi 9.

The cylindrical portion 11 has a plurality (four) of circumferentially extending locating notches 12 for the purpose of adjusting the position of an outwardly flared member 13 having an upstream frusto-conical portion 13a

and a downstream cylindrical portion 14 which is sliding fit on the cylindrical portion 11. In order to locate the member 13 with respect to the cylindrical 11, the cylindrical portion 14 is provided with a push button catch 15 which in its rest position, as illustrated in Figure 2, leaves an associated detent 16 in engagement with the most downstream notch 12 to prevent relative sliding movement of the two cylindrical portions with respect to each other. When the catch 15 is pressed, the detent 16 is pushed out of engagement with the particular notch 12 so that the two cylindrical portions can be slid axially with respect to each other to locate the member 13 in another position by engagement of the detent 16 with a different notch 12 by releasing the catch 15.

An inner frusto-conical vane 17 is mounted coaxially within the member 13 just upstream of the diverging portion 22 of the venturi 9 on which it is supported by thin axially extending support plates 18. An outer frusto-conical vane 19 is mounted coaxially within the member 13 radially outwardly of the vane 7 as by thin axially extending support plates 20. It should be appreciated that the vanes 17 and 19 with their associated support plates 18 and 20 serve to guide the stream of warm air through the outwardly flared path 21 defined by the member 13 and venturi portion 22 and whilst causing some deflection of the air stream hardly obstruct the air stream as will be hereinafter more readily understood.

In use, the hand-held hairdryer 3 is switched on at a temperature setting such as to heat air passing over the drier heating elements and out through the hairdryer nose 3 and into the attachment 1, as indicated by the arrow

30. The velocity and pressure of the warm air passing into the attachment is increased by the action of the venturi 9, whereby cool air as indicated by the arrows 25 is drawn in through the air entry apertures 5, into the reservoir 7 and out through the venturi aperture 8 as indicated by the arrows 26 in Figures 2 and 3. The cool air sucked in by the venturi mixes with the hot air passing through the venturi, as indicated by the arrows 32, to cause an increase in the volume, and a reduction in the temperature, of the air stream exiting from the venturi 9 as indicated by the arrows 33.

The kind of air stream which emerges from the attachment 1 depends upon the position of the outwardly flared member 13 in relation to the venturi 9. Thus, in the position where the member 13 is fully extended and the detent 16 engages in the most downstream of the notches 12 on the cylindrical portion 11, the location of the vane 19 in relation to the vane 17 and the diverging portion 22 of the venturi 9 is such that mixed air stream represented by the arrows 33 passes through and around the vane 17 and the vane 19 so as to expand, disperse or diffuse to fill the whole area of the outwardly flared path of 21. Thus, there is produced a smooth substantially uniform, unidirectional air stream represented by the arrows 34 which is substantially turbulence free when it emerges from the constraint of the outwardly flared path 21.

In the embodiment of Figures 1 to 3, the angle at the outlet of the outwardly flared path 51 defined by the inner surface of the frusto-conical portion 13 with respect to the axis 28 of the attachment is 11°, this angle being critical to avoid breakup of the air stream

after it has emerged from the constraint of the path 21. The critical angle can, however, be any other angle in the range of 10° to 25°. In tests where a ribbon was positioned at various points in the cross-section of the emergent air stream 34, it was found that the ribbon remained at substantially the same angle with respect to the axis 28 of the flow path 21, indicating that the air stream delivered by the attachment 1 is of substantially uniform cross-section.

If it is desired or necessary, circumferentially extending spaced apart slots 27 may be provided in the member 13 adjacent the outlet of the path 21, as shown in Figure 2 with a view to reducing any possible risk of turbulence at the outlet of the path 21. However, applicant has found that a substantially turbulence free flow can be produced without such slots.

In the retracted position of the outwardly flared member 13 as shown in Figure 3, the vane 19 cooperates with the vane 18 to prevent the air stream from diffusing outwardly to fill the entire area of the flow path 21. As will be apparent from Figure 2, the mixed air stream as indicated by the arrows 35 is centred, i.e. the air stream is reduced in width to provide a more concentrated flow of air emerging from the attachment as indicated by the arrows 36. Such an air stream will be at a higher temperature and of a greater velocity and pressure than those of the air stream 34 illustrated in Figure 2 and may be used where blow drying is required to shape the hair.

With a view also to avoiding any risk of turbulence adjacent the outwardly divergent portion 22 of the

venturi 9, where indicated at 29 in Figure 2, the wall of the member 13 may be provided with some small baffles (now shown) which project slightly into the periphery of the air stream.

In Figure 4, the embodiment of Figures 1 to 3 is modified by providing the venturi 59 with an annular array of six air channels 5a which are equispaced around the cylindrical portion 11 and which open at locations which are downstream of the neck 10 of the venturi instead of the air apertures 5. Besides the venturi effect which sucks cool air through the air channels 5a when the air pressure is increased by compression of the air at the narrowest point of the venturi, i.e. the neck 10, when the air flow flows out again, a slight vacuum is created and the sucked in air also helps in preventing turbulence.

The hairdryer shown in Figure 5 comprises a housing 52 from which extends a hollow handle 54 from the remote end of which (not shown) extends a length of flexible cable connecting the electrical components in the hairdryer to the electricity mains supply. As is already known, the handle 54 may house control circuitry in the form of components mounted on a printed circuit board to provide for selective energisation of both the electric motor 56 of the hairdryer and the coiled heater elements 58. By means which are already known, and which do not in themselves form part of the subject-matter of this invention, when a switch 60 or 62 positioned at the junction between the handle 54 and housing 52 is operated appropriately, the motor 56 may be switched between 'off', low-speed and high-speed positions. Similarly different parts of the heater element 58 may be connected

to the mains supply so that the heater can be independently 'off' or heat the air passing through it at up to three different rates.

The hairdryer of this invention may be designed to be hand-held, in which case its handle 54 may be shaped to facilitate its being gripped; or designed to be mounted on a stand for use, or designed to be detachable from the stand for independent use.

The stator of motor 56 is secured to an inner frusto-conical wall 64 forming part of casing 52 by means of radially-extending fins 66. At least one of the fins may be hollow in order to provide a conduit for the electric cables providing power to the motor windings. Fixedly mounted on the rotor 68 of the motor is an annular fan 70. When the motor is energised, the fan is arranged to pass a stream of air down the body of motor 56, through the fins 66 and over the heater elements 58 towards a circular throat 72. The throat forms the outer end of a parallel-walled or slightly frusto-conical continuation of the inner wall 64 of the housing. It will be appreciated that this change in shape of the airflow passage presented by wall 64 causes the direction of flow of the air leaving fan 70 to change to a small angular extent as it approaches throat 72.

On the upstream side of fan 70, the casing 72 is provided with perforations 94. Positioned between the perforated area of casing 52 and the inlet face of fan 70 is a substantially-circular disc 96 of air filter material. Although this is not shown in the drawings, part of the casing 52 may be removable in order to provide access to the filter 96 for cleaning or replacement purposes.

Contiguous with throat 72, the inner wall of the casing 52 defies a belled-out outlet passage 74 ending in a circular outlet 76 lying in a plane which is not parallel to the plane containing throat 72. The outer wall 78 of housing 52 is spaced outwardly of inner wall 64 for most of its length to form chambers 80 between the two walls. The outer wall has in it a circular series of openings 82 which permit air from the ambient atmosphere to enter chamber 80. The wall 74 of the outlet passage also has a circular series of openings 84 permitting air to flow from chamber 80 into the outlet passage when a pressure differential is established between the outlet passage and chamber 80.

In the broadest aspect of the present invention, the issuing airflow is always divergent. This may be achieved simply by making the outlet passage 74 of outwardly-divergent form, leaving the issuing airflow to expand laterally after it passes through throat 72, thus losing speed as it does so. This desirable airflow may be achieved by fitting one or more baffles 86 in the outlet passage, along the lines shown in Figure 6. The baffle 36 may have the same solid angle as passage 74, or a smaller one, so that a desired speed profile across the airflow leaving the hairdryer is obtained.

Positioned in the outlet passage is a frusto-conical baffle 86, having a pair of stub shafts 88 and 90 extending from it. Stub shaft 88 is journalled in a cylindrical extension 92 of the outlet wall 74. Although this is not shown in the drawing, either or both of the stub shafts 88 and 90 may be provided with means limiting their axial movement, so as to prevent the baffle 86 from becoming jammed against the inner wall 64. In addition

to being journalled in both the inner and outer walls of the casing, the lower (as viewed) stub shaft 90 has its outer end projecting from the casing 52. A knob or lever of suitable heat-resistant material is secured to the projecting end of shaft 90 so as to enable the user to pivot the baffle 86 between the position shown in Figure 5 and that shown in Figure 6.

When in the position shown in Figure 5, the baffle has its wider end virtually blocking throat 72, so that all the heated air leaving the heater elements 58 is constrained to flow towards and out of the narrow end of the baffle. This reduction in cross-sectional area of flow causes the speed of the air to increase, leading to the dryer producing a narrow stream of fast-flowing air, which may be very hot if all portions of the heater element 58 are energised.

In order to allow the hairdryer to produce a wide stream of slower-moving air, whether heated or not, the baffle is pivoted through 180° until it reaches the limit position shown in Figure 6. In this position, the air leaving the heater elements has a choice of two outlet passages. The first is through the centre of the baffle. As the cross-sectional area of this passage increases rapidly, the speed of the air entering the baffle rapidly decreases as it approaches the wider end of the diffuser. The other passage is the annular one provided between wall 74 and the diffuser. The cross-sectional area of this passage changes relatively slightly, if at all, so that the air leaves this divergent passage at substantially the same speed as it entered. Thus in this mode, the hairdryer provides a slow moving central airstream enclosed in a stream of faster-moving air.

However, the airflow speeds obtained in the Figure 6 mode are nowhere near as high as those obtained in the Figure 5 mode. In the Figure 6 mode, the hairdryer can provide a wide and divergent slower stream of hot air compared with the narrow and very-fast stream provided in the other mode.

The effect of the throat 72 in the Figure 6 embodiment is to accelerate the airstream and therefore to reduce its pressure, to produce the Venturi effect. The reduction of pressure in the throat and immediately downstream of it is to cause air to flow through passages 84 from chamber 80, and into chamber 30 through passages 82 from the atmosphere, thus leading to an air-cooled hairdryer.

As shown in Figure 7, but omitted from the earlier two Figures for clarity, the outlet 76 of the hairdryer may be provided with a grille 98. The grille may be in a relatively-thin disc, or it may have appreciable thickness. In the latter case, the bars of the grille may be shaped to provide parallel-sided individual outlet passages 100. This is effective in reducing any turbulence that there might be in the air which would issue from the drier and will also tend to cause the issuing airstream to be less divergent than without the grille.

Accordingly it will be seen that the present invention, in its broadest aspect, provides an electric hairdryer which ejects a wide slow airstream. In a preferred form a narrow fast airstream may be additionally provided by simple adjustment. A broad slow warm airstream does not damage the hair and can be used to dry the hair without the movement necessary to avoid damaging the hair when

using prior art hairdryers. If desired, the hairdryer of the invention may be used fixed on a mounting stand, leaving the person drying the hair both hands free.

Whilst particular embodiments have been described, the invention also includes all modifications and variations falling within its scope. For example, instead of having a sliding connection between the outwardly flared member 13 and the cylindrical portion 11, cooperating screw threads could be provided on the respective cylindrical portions 11 and 14. Moreover, although the attachment 1 has been described as being for use with a hand-held hairdryer, the attachment could well be adapted for use as part of, or for connection to, professional hairdryers which are not suitable for manual use.

CLAIMS

1. An electric hairdryer comprising a housing, an electric motor therein, an axial fan secured to the motor and adapted to pass a stream of air over electrically-energised heater elements located within the housing to cause the heated air to flow through a circular throat, the housing having an outlet passage of divergent axial cross-section, wherein the hairdryer when it is running is capable of producing a stream of air at a flow rate through the housing of 60-90 litres per second having a speed of 220-360 cm per second and a temperature of 45°-60°C at a working distance of 40-46 cm from the outlet passage.

2. A hairdryer as claimed in Claim 1, having a venturi of circular cross-section located coaxially between the circular throat and outlet passage.

3. A hairdryer as claimed in Claim 2, wherein a surrounding wall of the venturi has at least one air entry aperture which is in communication with the ambient air.

4. A hairdryer as claimed in Claim 3, wherein the venturi has a plurality of air entry apertures which form a ring of apertures around the surrounding wall.

5. A hairdryer as claimed in Claim 3 or 4, wherein the or each air entry aperture communicates with the air exit aperture of the venturi via an air reservoir, which in use, is at a lower pressure than that of

the ambient air.

6. A hairdryer as claimed in Claim 2 having air channels which are in communication with the ambient air that open out onto the venturi.

7. A hairdryer as claimed in Claims 2, 3, 4, 5 or 6 having at least one inner vane downstream of the venturi.

8. A hairdryer according to Claim 7 having at least one outer vane disposed outwardly of and extending downstream of the inner vane.

9. A hairdryer as claimed in any of the preceding claims, including at least one hollow frusto-conical baffle mounted in the outlet passage with its narrow end near the throat, and its wide end remote from the throat.

10. A hairdryer as claimed in Claim 9, in which the baffle is rotatable about an axis transverse to the airflow between one limit position in which its wider end substantially closes the throat to direct the air passing through the throat to issue from the narrower end of the baffle, and another limit position in which its narrow end is spaced substantially uniformly from the throat to direct the air passing through the throat both through and around the baffle.

11. A hairdryer as claimed in Claim 10, in which the baffle has stub shafts projecting from it which are each journalled in the housing to define the axis of

rotation of the baffle, and in which one stub shaft projects beyond the outer wall of the housing and carries on its outer end actuating means by which the shaft can be turned to pivot the baffle between its two limit positions.

12. A hairdryer as claimed in any preceding claim, in which the motor body is mounted on substantially radially-extending fins adapted to reduce the turbulence of the air leaving the fan.

13. A hairdryer as claimed in any preceding claim, in which the housing of the hairdryer is perforated on the upstream side of the fan, and in which a disc of filter material is positioned between the perforated wall of the housing and the fan.

14. A hairdryer as claimed in any preceding claim, in which the housing is double-walled whereby the outer wall of the housing is insulated by air from the inner wall of the housing, which inner wall is heated directly by the air flowing through the drier.

15. A hairdryer as claimed in Claim 14, in which the space between the walls is in communication with the ambient atmosphere through a circular series of apertures, and with the outlet passage downstream of the throat through another series of apertures.

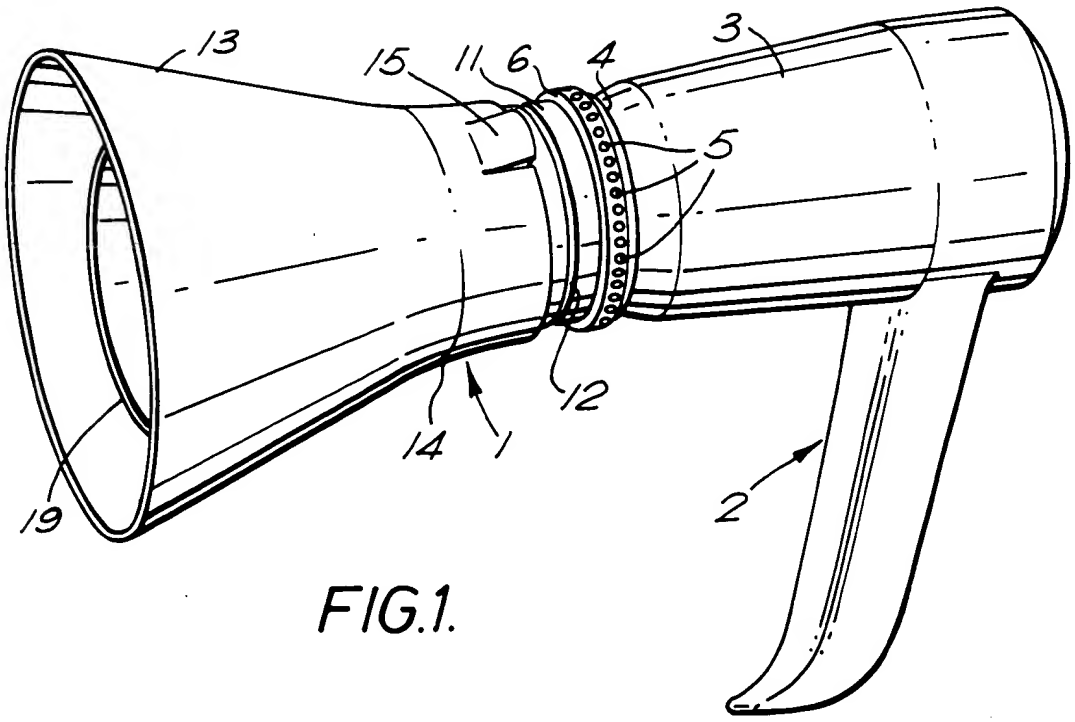
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FIG.1.

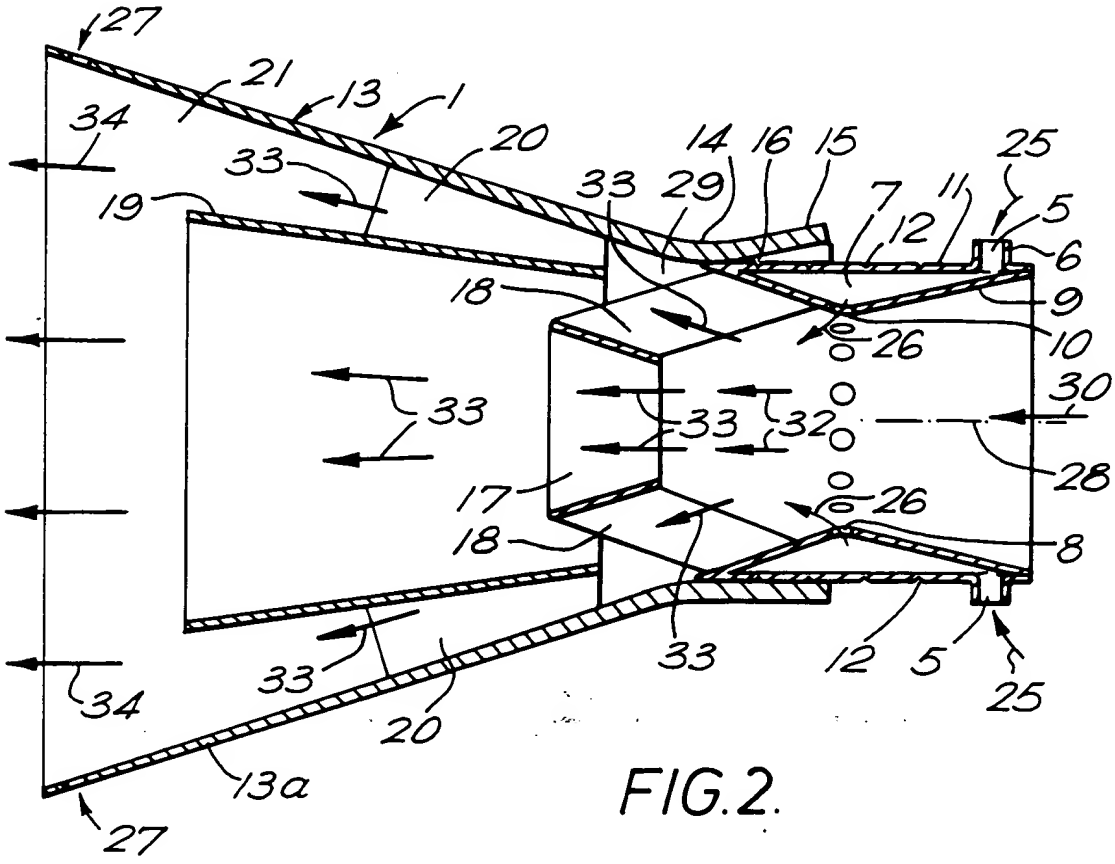
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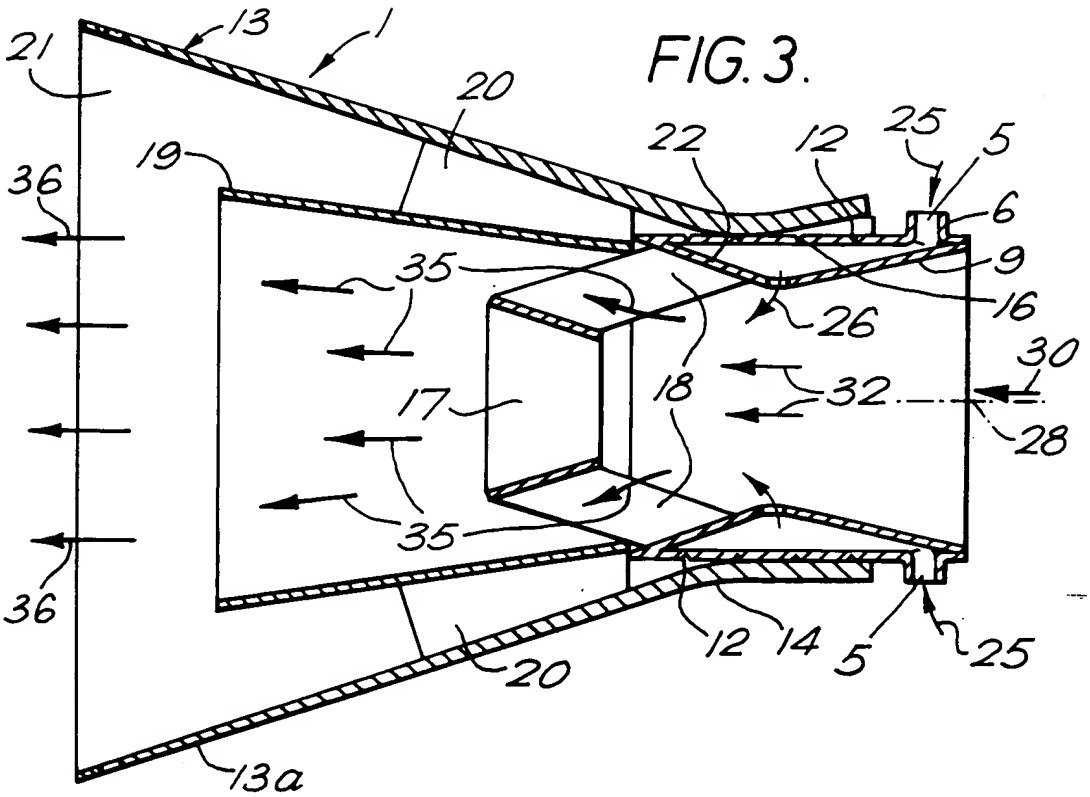
FIG.2.

FIG. 3.


21
13
1
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22
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6
9
16
26
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32
28
19
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35
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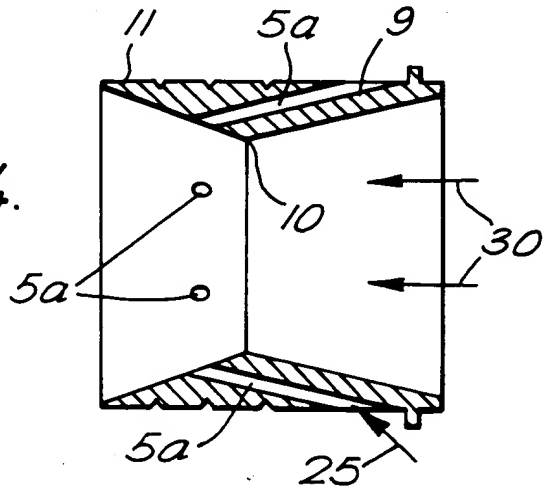
18
35
36
12
14
5
25
20
13a

FIG. 4.


11
5a
9
10
30
5a
5a
25

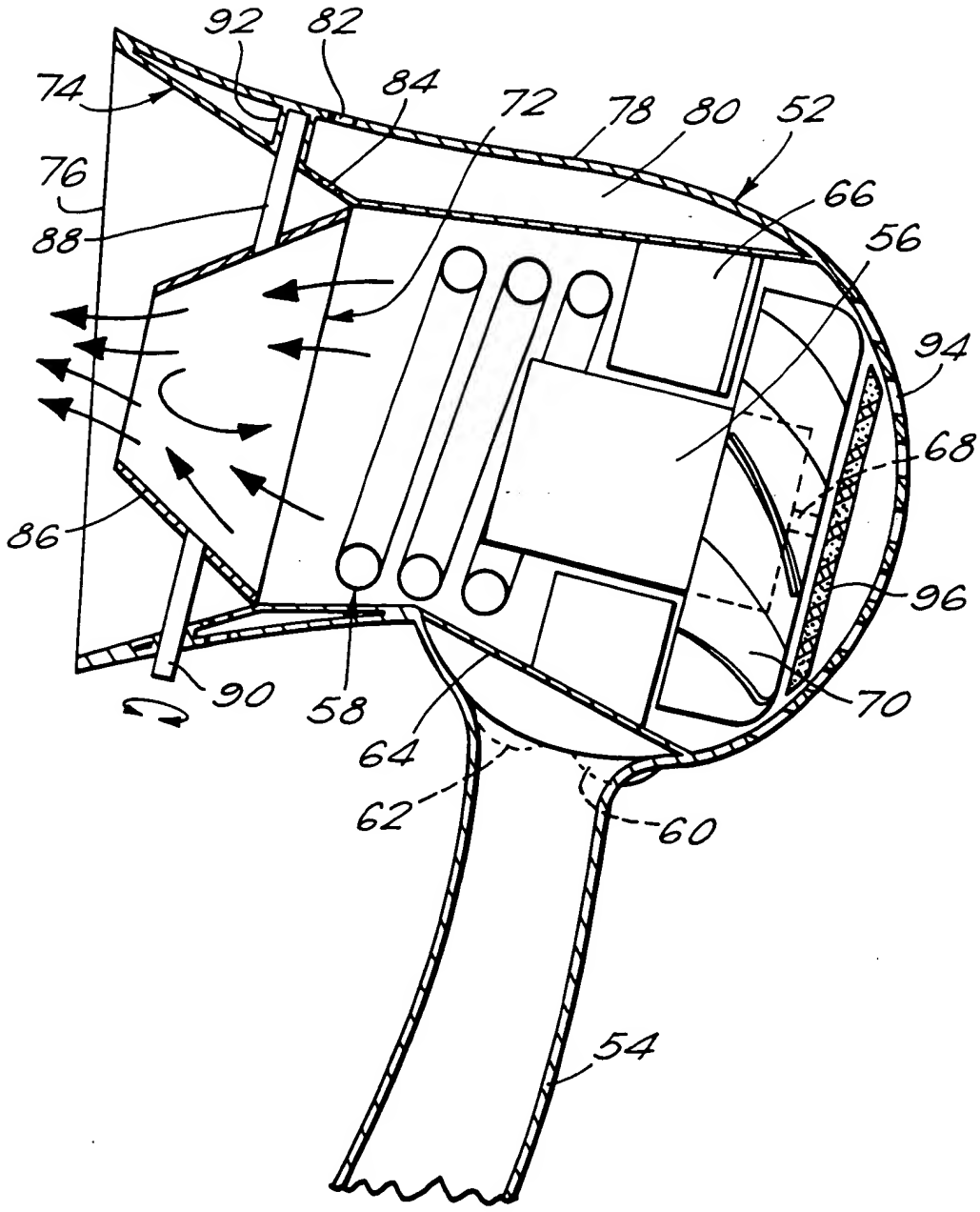


FIG. 5.

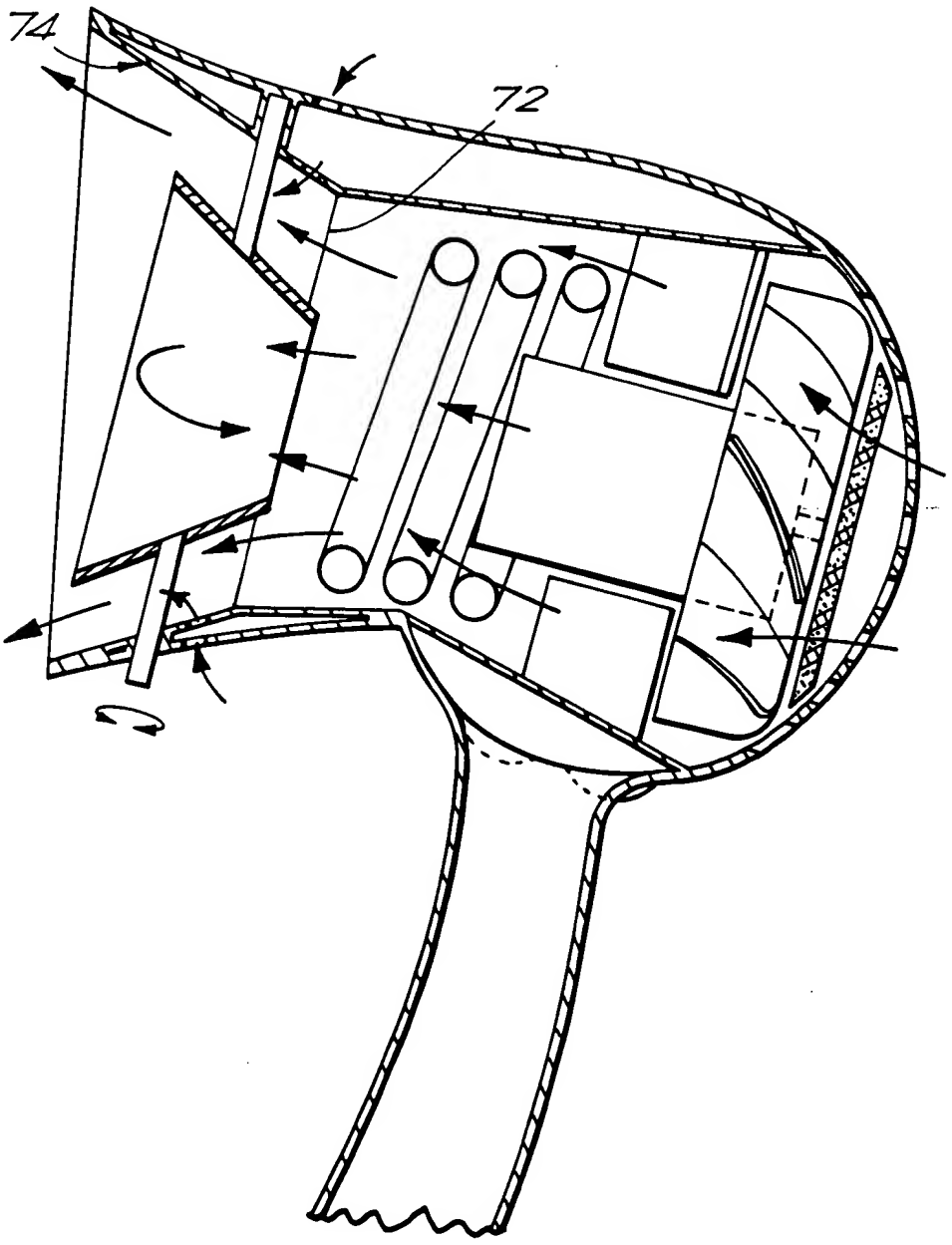


FIG. 6.

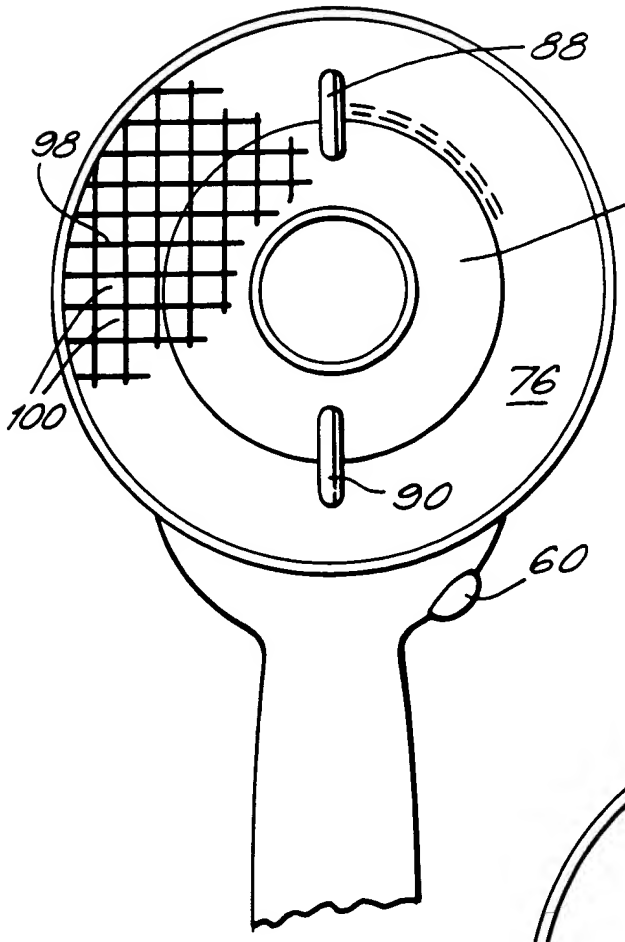


FIG. 7.

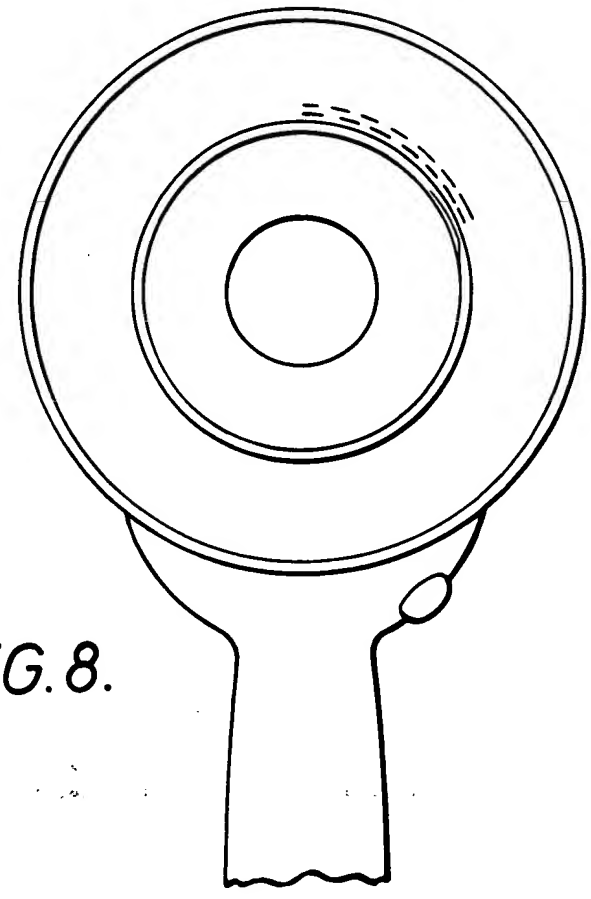


FIG. 8.

INTERNATIONAL SEARCH REPORT

Internati nal application No.
PCT/GB 94/00797

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP,A,0 439 781 (BRAUN) 7 August 1991 see the whole document -----	1

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/GB 94/00797

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
GB-A-2068222	12-08-81	US-A-	4287673	08-09-81
		AU-A-	6610481	16-07-81
		CA-A-	1143935	05-04-83
EP-A-0260371	23-03-88	US-A-	4767914	30-08-88
GB-A-2232589	19-12-90	NONE		
FR-A-2446615	14-08-80	NONE		
US-A-5060398	29-10-91	NONE		
EP-A-0439781	07-08-91	DE-A-	4002944	14-08-91